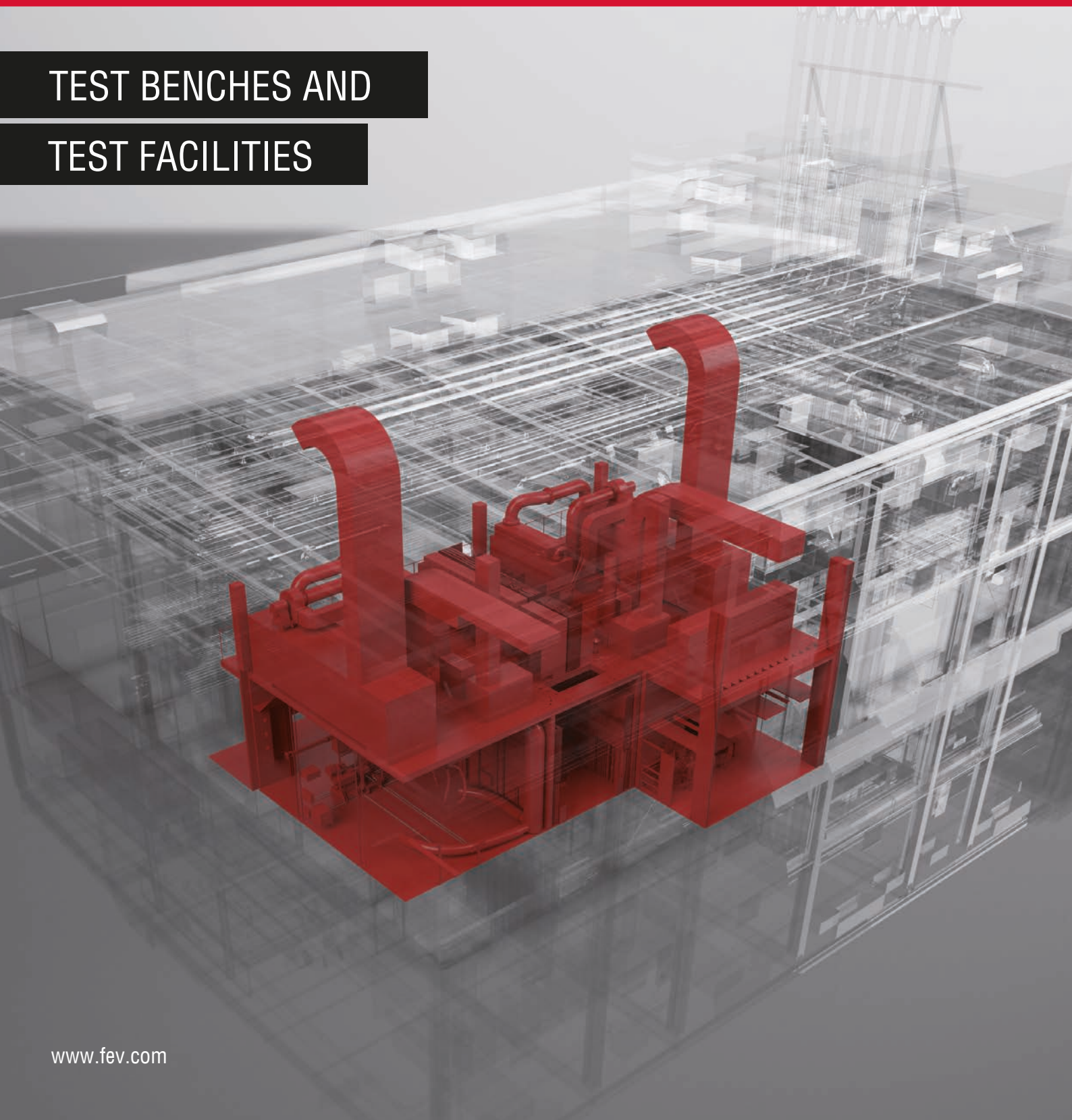




Concept and planning



TEST BENCHES AND
TEST FACILITIES



MORE THAN THREE DECADES OF EXPERIENCE WITH TEST BENCHES & TEST FACILITIES

» Are you planning a modernization, expansion
or a complete new building? Feel free to contact us! «

For more than 36 years FEV plans, builds and operates test rigs and test facilities. At the beginning for the own use at Aachen, since the early 90's also for our customers and today in 5 own test centers in Europe, Asia and the USA.

In a combination of own installations, which are always oriented towards the development or testing requirements of our engineering customers, as well as special customer demands comple-

te specifications are developed for all aspects of a test bed, a test facility and for a complete test field installation.

From planning not only technical requirements and aspects should be considered, but particularly operative and economic criteria are taken into account.

On the basis of technical and operational requirements customized solutions are developed and implemented.

Here special emphasis is placed on the presentation of sustainable solutions that will secure a flexible and efficient use of existing investments for many years.

Based on a portfolio of more than 300 testbenches realized and supported by the operating experience from over 140 in-house test benches we can develop the right solution concept for your specific needs and tasks.

OUR SERVICES INCLUDE:

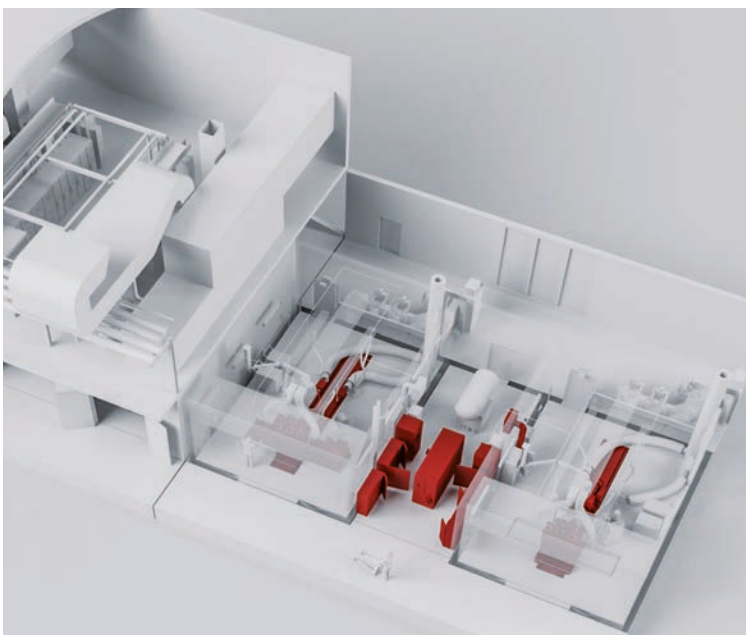
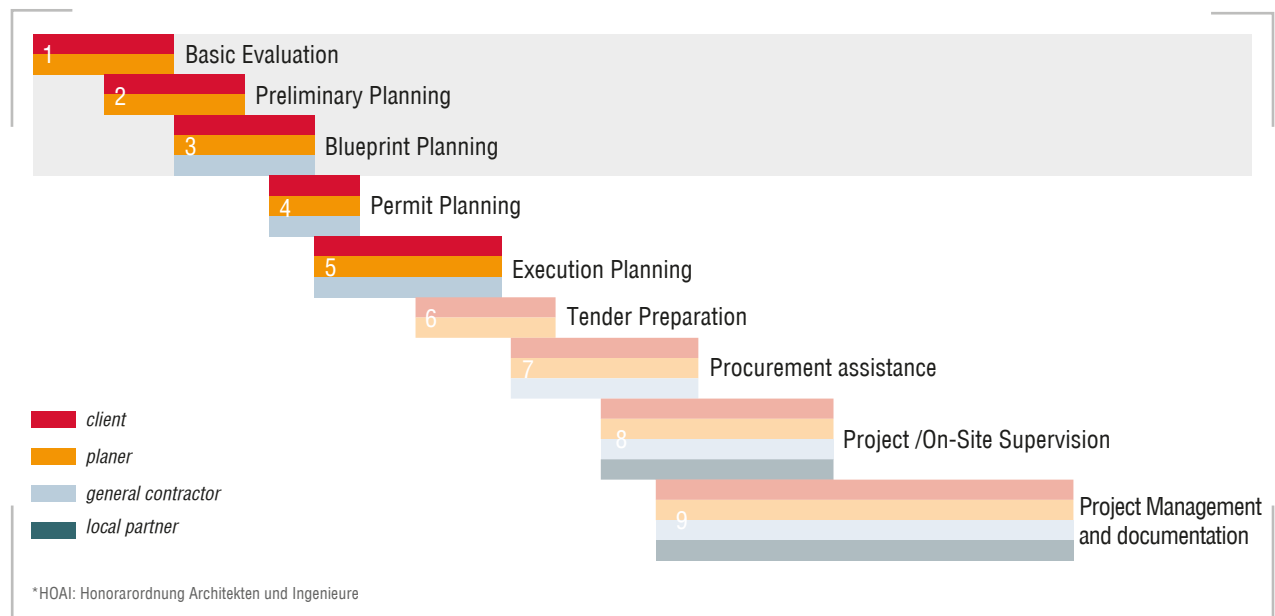
- » Operating and week point analysis
- » Preparation of requirement specifications
- » Creation of concept studies
- » Implementation of feasibility studies
- » Concept development and design planning
- » Support for approval and execution planning
- » Support for procurement and implementation



Our team

CONSULTING, CONCEPT DEVELOPMENT AND PLANNING

» Typical Project Phases based on HOAI* «



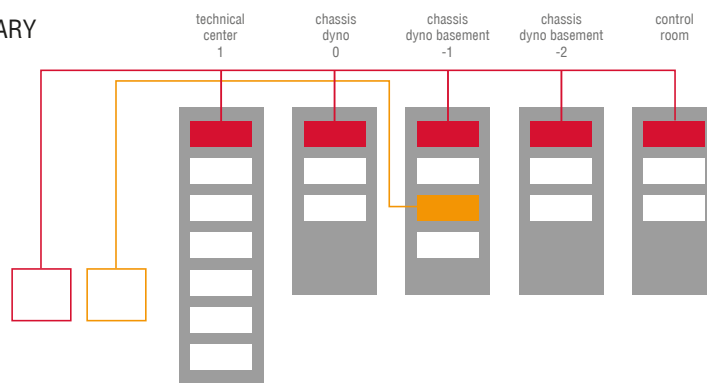
SCOPE OF SUPPLY AND SERVICES:

- » Functional specification
- » Technical boundary conditions
- » Approval/Legislation boundary conditions
- » Process description
- » Room book
- » Functional concepts and specifications
 - › Media supply
 - › Energy supply
 - › Test bench equipment
- » Calculation of media and energy supply systems
- » Safety concepts and equipment
- » 2D and 3D Planning documents
- » Conceptual design of building management systems
- » ...

STEP BY STEP FROM PRELIMINARY PLANNING AND BLUEPRINT PLANNING ...

» Complete detailed and precise preliminary and blueprint planning as a key factor for success «

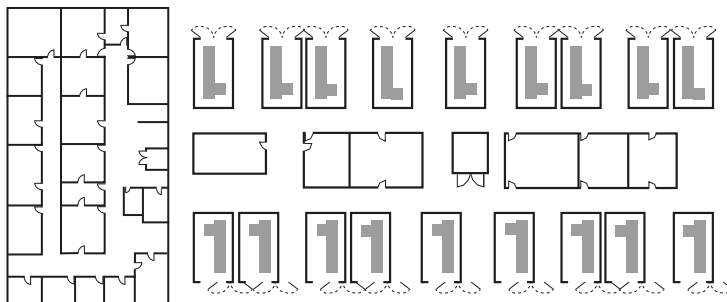
1 PRELIMINARY PLANNING



Based on the basic evaluation the preliminary design will be developed as a basis for all following planning steps. The basic input will be analyzed, 2D floor plans, cross sections and views will be worked out along with a rough estimation for cooling and chilled water media and electric power supply.

Additionally a rough cost estimation in accordance with DIN 276 can be given. Alternative solutions can be provided on demand.

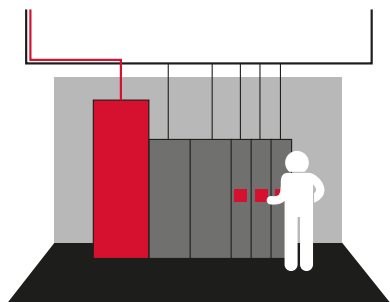
2 2D CONCEPT



As part of the preliminary planning first floor plan sketches/ drawings will be worked out on basis of the room book specifications.

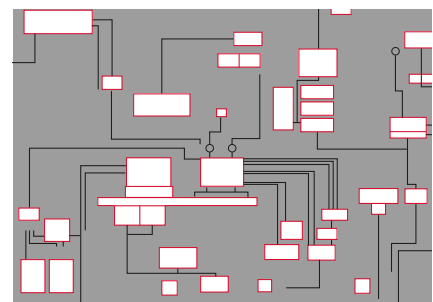
This first floor plan concepts will be optimized with regard to available space, work process organization, matching of test cells to central media and power supply devices etc..

3 BLUEPRINT PLANNING



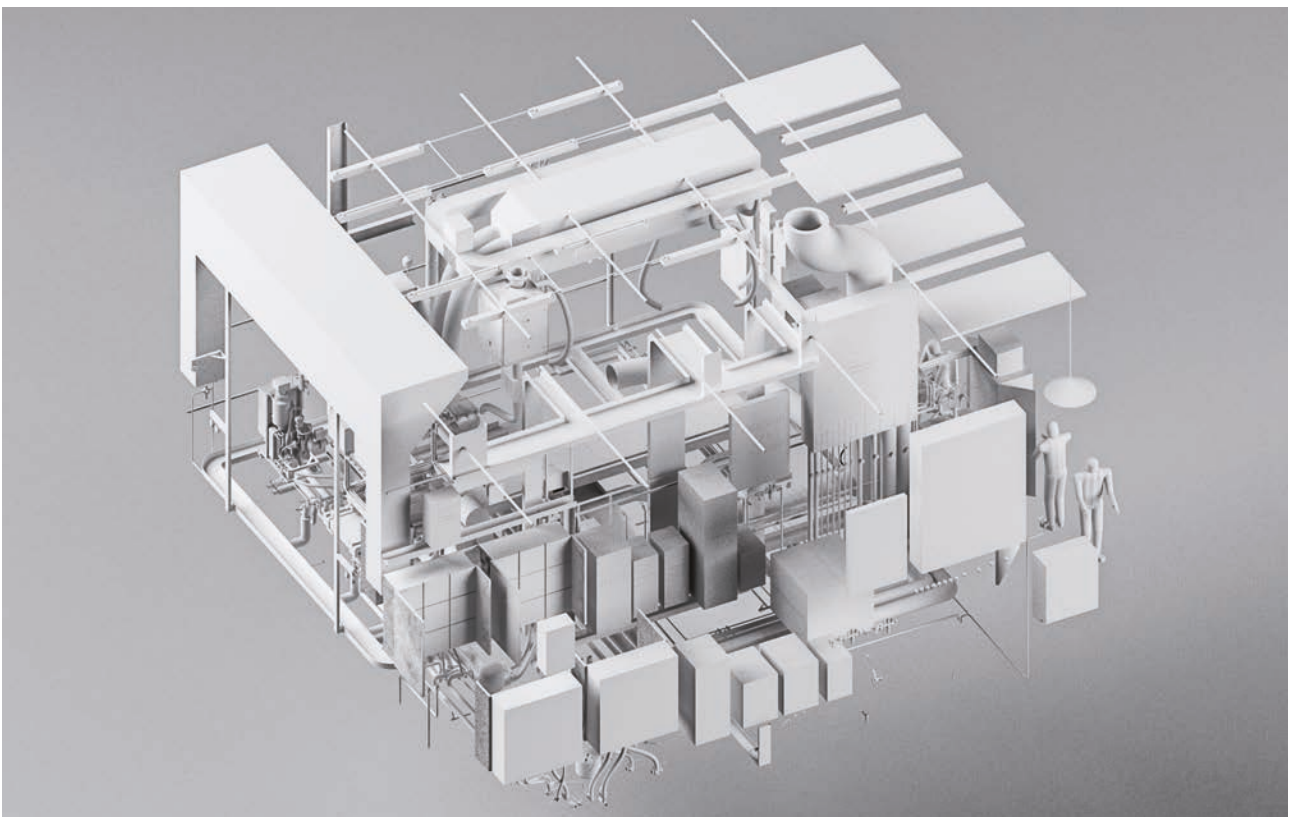
Based on the preliminary design, the final planning concept will be fixed under consideration of design, functional, technical, construction physics, economic and energy efficiency aspects with including all specified components. 2D floor plan, cross sections and views are further detailed and a 3D model will be created. The rough cost estimation will be further detailed in accordance with DIN 276. For projects that require an official approval/ permission, the blueprint design provides the basis for subsequent approval planning.

4 BLOCK DIAGRAM



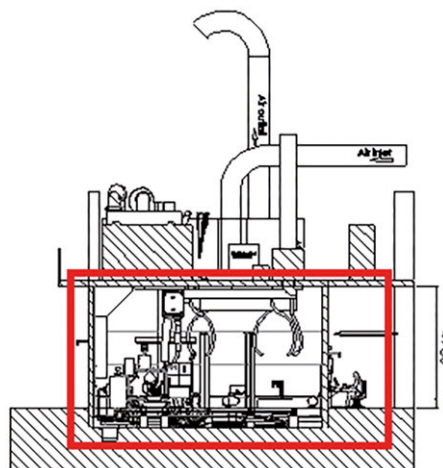
... VIA EXECUTION PLANNING ...

» Example execution planning engine test cell «



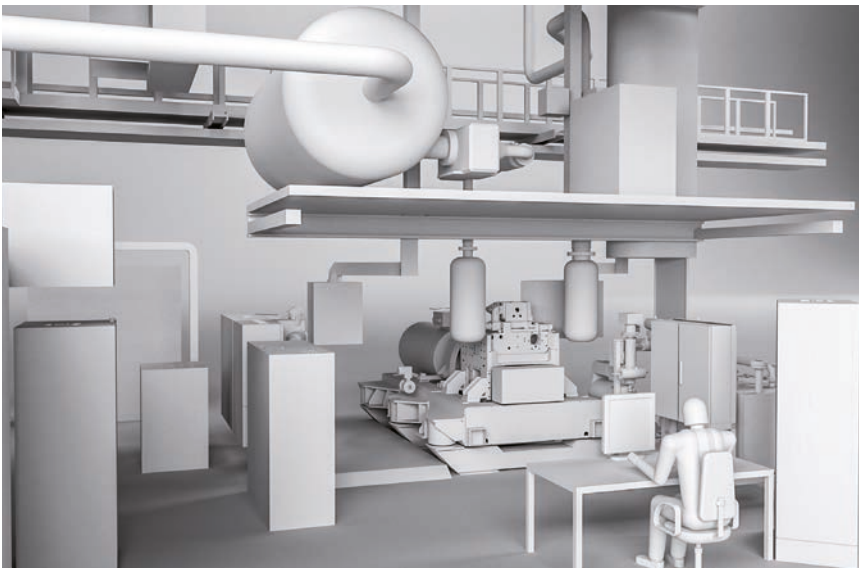
REALIZED SOLUTIONS INCLUDE:

- » Engine test benches from 0.5 kW to 6 MW
- » Powertrain test benches
- » Transmission test benches
- » Component test benches
- » End-of-Line test benches
- » Battery test benches
- » Special test benches (incl. low temperature test benches and climate roller dynos)
- » Test bench part systems

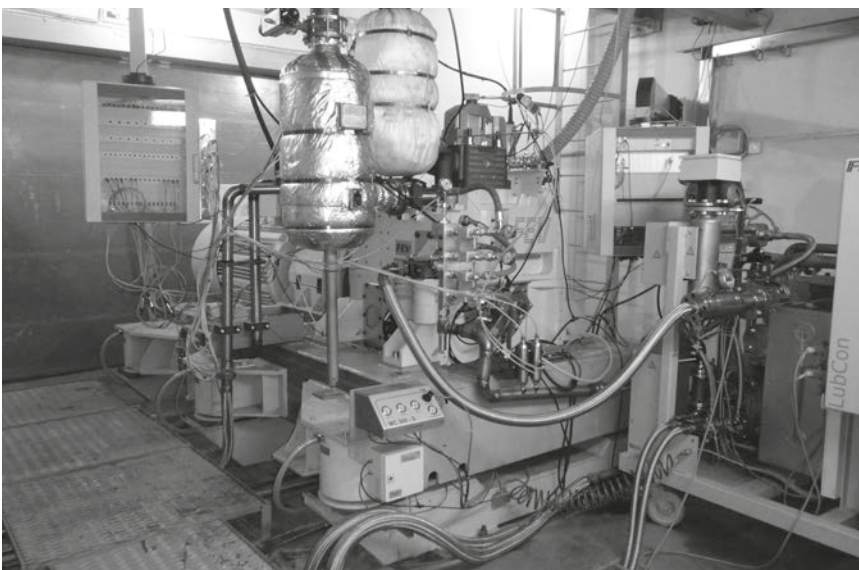


... TO THE EXECUTED PROJECT

» More than 300 realized projects worldwide fulfilling specific customer demands «



Single cylinder engine test bench planned



Single cylinder engine test bench Installed

SINGLE CYLINDER ENGINE TEST BENCH TASK:

- » Installation of a new FEV LB single cylinder test engine in a refurbished test cell including:
 - › Basic evaluation
 - › Preliminary planning
 - › Blueprint planning
 - › Execution planning
 - › Delivery and installation of the engine and the complete test bench systems

Are you planning a modernization/refurbishment
or a new test center? Please contact us!

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